

A STUDY OF GRASSHOPPER SPECIES COMPOSITION IN PRIMARY AND SECONDARY GROWTH IN COSTA RICA¹

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ABSTRACT: Three tropical communities in Costa Rica were studied to determine if there were distinctive kinds of grasshoppers peculiar to each. The three communities sampled were mature tropical forest, transition or "edge", and secondary or cleared areas. Samples were taken at a lowland tropical rainforest at sea level and at a Pacific highland forest, 1500 meters in elevation. Preliminary results indicate that there are few, if any, species in the mature forest, a number in the "edge" and the greatest majority present in the secondary growth.

DESCRIPTORS: Costa Rica; grasshopper ecology; tropical communities.

The purpose of this study is to determine if the abundance and variety of grasshoppers are different in three adjacent communities. These three communities are: mature tropical forest; recently cleared tropical forest; and the area where tropical forest and cleared area come together. This third community is called "edge". Edge contains species of flora and fauna from the two communities; it may also have species distinct to itself. The field work for this study was done during July 1973 (rainy season) at two localities in Costa Rica. One locality in Heredia Province was at the Organization for Tropical Studies Research Station "Finca La Selva" near Puerto Viejo; and the other in Puntarenas Province at Monte Verde. The former is a rich Atlantic lowland rain forest near sea level, the latter is a montane situation on the Pacific side at an altitude of 1500 meters.

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METHODS

Collecting was done by hand and with a butterfly net. All specimens were caught after they were seen; no general sweeping with the net was done to secure specimens. Grasshoppers were killed in a jar with cyanide and preserved dry.

Areas to be sampled were selected that had a broad contact of forest and cleared area. Once an area was selected to be sampled, a transect was run 37 meters into the cleared area, then through the edge to the forest where it was continued for another 37 meters. Collecting of grasshoppers was done 1 meter on either side of this transect.

RESULTS

The study was performed on July 5, 1973 at La Selva. The sampling was done just after a rain and it was partly cloudy. This area is Atlantic Lowland Tropical Rainforest, Frankie et al (1974).

The cleared area had scattered trees among the secondary growth; this secondary growth consisted of thorny bracken fern 1 meter tall, low shrubs and emergence growth to 4 meters high. The transition area had some plants from both the cleared area and forest, but no plant species of its own. The forest was a typical lowland tropical rain forest with tall buttressed trees and an understory of mostly palms. The forest floor had little leaf litter. It was dark inside the forest by about 3:30 P.M.

There were distinct changes in species composition and numbers of grasshoppers indicated by sampling. Table 1 shows that 4 species were common in the second growth, but grasshopper variety and numbers decreased in the edge, although a new species was collected. The forest was void of grasshoppers except for a first or second instar eumastacid.

The second site of study was Monte Verde which is Pacific Highland forest at 1500 meters elevation, Rentz (1975). The cleared area was on a hillside and consisted of grass and other low vegetation to 1 meter in height. The vegetation in addition to the grasses consisted of low shrubs, bracken and low forbs. Blackberry

was the most common shrub. The edge, as at La Selva, contained no distinct species of flora, only species of the cleared area and the forest. This edge was about one half meter wide. The was composed of trees not exceeding 10 meters in height.

In this situation, only in the cleared area were grasshoppers found. The edge and forest were both void of grasshoppers. In other collecting, a grasshopper of the genus *Rhichnoderma* was caught at Monte Verde in an edge situation. This grasshopper may be an edge species.

DISCUSSION

From the data I presented, the most important conclusion to be drawn is that acridoids of the understory decrease in numbers as one goes into the forest. There is also indication that species may change as the habitat changes from cleared area, to edge, to forest. In past literature there is mention of grasshoppers in cleared areas to edge situations, Hebard (1924), Rehn (1929), Rehn and Rehn (1934). However, there is also some mention of acridoids being in forest situations, particularly eumastacids, Rehn and Rehn (1934). Many tropical acridoids appear to be inhabitants of forest glades, cleared forest, or edge. These situations could occur naturally when a large tree falls, causing a break in the forest. Along with this understory fauna of grasshoppers, there is evidence of a treetop fauna of grasshoppers, Roberts (1973).

There are probably many reasons for this seemingly limited fauna of the tropical forest understory. One reason might be that many grasshoppers that feed on grasses find forest grasses not suitable for food or not extensive enough to survive on, Jago (1973). Lack of places to oviposit in the forest understory, or lack of sufficient sunlight may be other explanations for the paucity of grasshoppers in the forest understory. Grasshoppers have not been completely excluded from inhabiting the tropical forest understory; some groups like the eumastacids may even be adapted to the understory. However, this study and past literature records indicate that in Central America, tropical acridoids seem to live more in open situations than forest understory.

TABLE I.

THIS TABLE LISTS THE SPECIES AS FOUND WITH NUMBERS OF INDIVIDUALS FROM THREE REPETITIONS IN PARENTHESSES. NO SUITABLE "EDGE" WAS LOCATED AT MONTE VERDE.

	Forrest understory	Edge	Secondary Growth
La Selva	eumastacid nymph (1)	<i>Eumastax</i> sp. (1)	<i>Rhaclitercagra aeruginosa</i> (2)
		<i>Microtylopteryx</i> (1)	<i>Leptomericinthropora</i> sp. (6)
			Microtylopteryx sp. (3)
		<i>Osmilia</i> sp. (1)	<i>Lithoscirtus bimaculatus</i> (2)
			<i>Taenipoda</i> Nymph
Monte Verde	no species found	no species found	<i>Schistocerca</i> sp. (2)
			<i>Silvitctrix</i> sp. nr. <i>communis</i> (24)
			<i>Dichroplus</i> sp. (3)
			unidentified nymphs (7)
			unidentified acridine (1)

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ERRATUM

In my paper on New Southwestern Bombyliidae, ENTOMOLOGICAL NEWS, 86:112, in the publication of the name *Parabombylius rutilous* there was an inadvertent error in the spelling of the species name *rutilous*. I had intended the Latin adjective *rutilus*, but for some now inexplicable reason the paper was submitted with the misspelling and was not caught on page proofs. My thanks to Mr. George C. Steyskal for pointing out this error.

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